628

From the Author

AN INTRODUCTORY

DISCOURSE,

DELIVERED IN

THE AMPHITHEATRE

OF THE

London Institution,

ST GEORGE'S HOSPITAL MEDICAL LIBRARY

ON WEDNESDAY THE 5TH OF MAY, 1819,

BY

WILLIAM THOMAS BRANDE,

SECRETARY OF THE ROYAL SOCIETY OF LONDON, AND
PROFESSOR OF CHEMISTRY IN THE ROYAL
INSTITUTION OF GREAT BRITAIN.

ST GEORGE'S HOSPITAL LIBRARY

LONDON:

PRINTED BY RICHARD AND ARTHUR TAYLOR,
SHOE LANE.

1819.

WELLCOME
LIBRARY
INSTITUTE

INTRODUCTORY DISCOURSE.

I HAVE been honoured by the request of the Board of Management of this Institution, to deliver a course of lectures on the Principles of Chemical Science; and, highly as I am flattered by the distinction which they have thus deemed it right to confer upon me, I should feel uneasy and embarrassed, were I not, on this occasion, and at the very threshold of my undertaking, to assure you that I have acquiesced in their wish, under the impression of considerable diffidence, and a somewhat painful anxiety; that I had hoped and expected that a task so arduous and important, would have devolved upon an abler Professor, and would have been consigned to one of more eloquence and ability than the very humble

individual who now stands before you, to plead the cause of science. I should, indeed, have altogether declined the office, and shrunk from its responsibility, had not experience already convinced me that candour and kindness would be the prevalent feelings of my audience, and that they would dispense these in direct proportion to my wants, if they find my exertions unremitting; my zeal unextinguishable; and my desire, limited only by my power to excel.

Under these impressions, I enter upon my design, not with fear and trembling, but with confidence and alacrity; rejoicing in the opportunity of showing my zeal in the cause in which we are embarking; and of conducting you, to the best of my abilities, into the enchanting realms of experimental science.

On account of many circumstances, which it is quite unnecessary to recur to, no attempt will be made, during the present season, to institute a regular series of philosophical or scientific instruction; to speak the truth, our means are inadequate to such an undertaking; our forces are scattered

and it will require time, and skill, and exertion, to marshal them into order, and to bring them, duly equipped, into the field: indeed, it is to the unremitting zeal and activity of your Board of Management, that such arrangements, in respect to apparatus and assistants, have been made, as enable me, upon the present occasion, to open my course with the most ample confidence that nothing will ever be wanting on their part, to furnish such auxiliaries and supplies with a liberal and discerning hand.

As chemical science will form a feature, and, I trust, a prominent one, of the various courses of information and instruction, that are to issue from this room, it shall be my earnest endeavour to lay before you, in simple, but perspicuous terms, the leading objects of that important and beautiful department of physical knowledge; to make you acquainted with some of its already achieved conquests in the dominion of nature; and to expose some of the probable results of its future progress; and I propose to fulfil these intentions by an experimental inquiry into the powers and properties with

which matter is endowed, and which as it were, preside over its chemical energies, causing, modifying, or preventing them. These, I hope, will soon be rendered familiar to you under the heads of Attraction, Heat, and Electricity, for such these powers are.

It shall be my great object to accomplish these ends in the most clear and perspicuous manner; to divest those branches of science that I am to deal with, of all abstruse and recondite terms; to destroy the fortification of hard words and hidden meanings with which they are sometimes surrounded; and to show that they may really be brought home to the "business and bosoms of men."

But, before I proceed to any further remarks, or expatiate upon the particular objects and ends of my own department of knowledge,it becomes me to remember, that we are to-day, for the first time assembled within these walls to pay our tribute to literature and science at large; that the doors are opened to every range of scientific inquiry, and classical erudition; to every at-

tainment which can expand, embellish, and improve the mind of man. Under these circumstances, I say, it becomes me to speak in more general terms; and I shall, therefore, endeavour to set forth a few of the advantages that society may expect to derive from this munificent establishment; to show how far it merits your patronage; and to convince you that, in the work we are undertaking, regard is not merely to be had to its immediate consequences, but that we are to consider its influence upon aftertimes, and to look to the benefits that it is to diffuse upon generations yet to come. And I am convinced that I shall be able to show, that in establishing this Institution in the heart of the city of London, you have done a great and glorious deed for posterity; you have opened a fountain which will never be dried up, but will continue to flow into, and fructify the commonwealth of science for ages yet to come.

The projectors of this Institution deserve our first thanks; they have shown the fallacy of the opinion entertained by the greatest political philosophers; and have demon-

strated, that high commercial rank and wealth are not incompatible with enlarged minds, liberal views, and cultivated understandings. We are told that, considering the mercantile eminence of their country, and persuaded that whatever increases the splendour, increases equally the strength and activity of commerce, they thought it due to the dignity and glory of the Empire, that her commercial Metropolis should be graced by a literary and scientific Institution, on a liberal and extensive plan. They judged, and wisely did they judge, that such an establishment would make commerce acquainted with science; and that, by their approximation, each would draw forth and invigorate whatever there might be of latent energy and power in the other. We accordingly find that, under this liberal and creditable feeling, they submitted their views to the consideration of their fellow-citizens, and solicited their co-operation; that their design was universally approved, and that a subscription of considerable amount was almost immediately raised within the walls of our city.

Such was the auspicious beginning of this establishment. The Royal Charter was then obtained, and on the 4th of November, 1815, the first stone of the mansion in which we are now assembled was lowered into its place by the Mayor of London, assisted by the President, Vice-Presidents, and Managers of the Institution. As the building advanced, its growing wants were met with proportionate liberality, and a magnificent Library and Amphitheatre, with their various auxiliary apartments, have been at length brought under the same roof, constituting one of the noblest ornaments of the city of London.

I shall first ask your permission to dilate somewhat upon the immediate advantages and benefits which may reasonably be expected to result from this undertaking. Let us here, however, pause for a moment, to express our earnest wish and humble hope that the great Disposer of events may approve of the motives of this assembly; that His blessing may rest upon the work; that He may render it, in our hands, subservient to the great and disinterested purposes of

extensive utility, which it is its sole object to attain ; and that in future times this edifice may be the glory of our children's children; that commerce and science may here be entwined in perpetual friendship, uniting their strength for the glory of the empire, the stability of the throne, the perpetuity of our glorious constitution, and the prosperity of the people at large.

The intimate union that subsists between science and commerce, and between literature and the arts; the individual, and, therefore, the public improvement to which this union tends ; its influence in elevating, in the rank of nations, the countries that are blessed by its happy influence, are truths inculcated by our knowledge of the world, and with illustrations of which every page of history teems. But history also records the downfall and degradation of learning ; she shows us that, where Science and the Arts once flourished in all their vigour, and grew, as it were, in a native soil, they subsequently withered and decayed, leaving little else behind than a few solitary relics, which, like the ruins of some great edifice

or temple, in the midst of a barren plain, tell us that magnificence once dwelt, where we now see nothing but sterility and desolation. Such are the truths recorded by the unerring pen of history, which has shown that even when knowledge and taste had been interwoven with the very manners and habits of a people, and disseminated amongst large and prosperous nations, frequent instances have occurred of their utter loss and obliteration; insomuch that their very existence would be problematical, were it not for the undeniable proofs, which they have left of their former excellence, and which, measured by the powers and capacities of succeeding ages, appear like the productions of a superior race of beings.

Thus, as one of our poets has beautifully expressed it, "the dawn of human improvement seems to have smiled upon that fabric which it was ultimately to destroy, as the morning sun gilds and beautifies those masses of frost-work, which are destined to vanish before its meridian splendour."

Reasoning upon these things, historians have sometimes gloomily denounced those

happy emotions which a Nation rising to eminence is apt to produce in a liberal and humane mind: they have talked to us of the declension of our natural energies, and have told us, that all our struggles and exertions though tending to temporary splendour, will ultimately be involved in a desolate abyss; that the productions of age, can stand in no competition with the vigorous sallies of youth. From the days of Homer, this has been the burthen of the poet's song, and the opinion has, in many cases, received the deliberate sanction of the Philosopher. Adverting to this subject, a late eloquent writer* has observed, that although opinions mostly obtain credit by their antiquity, this opinion, in particular, derives no advantage from that circumstance; on the contrary, that very antiquity is the most decisive proof that it is wholly unfounded. If, says he, the human race had declined from its pristine vigour between the period of the Trojan war and the time of Homer, to what a degree of imbecility must it have fallen in the reign of Augustus! "And if, in like manner, the

* Mr. Roscoe.

complaint of the Roman poets, of the deterioration of the human race be well founded, to what a miserable state of degradation must it before this time have been reduced! After so long a descent, is it possible that nature could still have produced a Dante or an Ariosto, a Corneille or a Racine, a Shakspeare or a Milton, names which amply show that her vigour is not exhausted, but that she still continues to bring forth the fruits of the mind no less than those of the earth."

If we ascend from poetry to those nobler and more divine energies of the human mind which are employed in the search after truth; in removing the film from the intellectual eye of man; in developing the mechanism of nature by experimental research; we have only to mention the names of Kepler, Galileo, and Copernicus; of Boyle, Bacon, Newton, and Hooke, to show that here nature has neither retrograded, nor remained stationary. It is folly, therefore, to assert, that the golden age has passed away, and that man is suffering corporeal and intellectual degradation. On the contrary, let us hope, that if not baffled by its own perverse-

ness, the human race is really tending, in regular and progressive course towards improvement, and that every age of the world is more enlightened than that which preceded it. We know that history does not exactly bear us out in these hopes; but we shall presently be able to trace the cause of such disappointment, and to calculate upon the probability of its continuance.

Among the causes that have contributed to those vicissitudes of the human energies of which we have been speaking, some have, I think, ignorantly adduced local situation and climate; but let us remember one contradictory instance only, and it will be sufficient to confute such a notion. "Let us remember that the Greeks rose from the very dregs of barbarism till they became the masters of the world, and that that very Greece which was so long the garden of Europe, afterwards became a sterile desert. Bœotia lay in the vicinity of Attica, and consequently enjoyed the same climate; yet were the Bœotians as dull as the Athenians were acute. The splendour too of Grecian science was diffused not only through Greece

itself, but extended to colonies far distant from the metropolis, and very different with respect to climate*."

There are writers who have told us, that there is a tide in the arts and sciences which always tends to their elevation and declension; and further, that when they come to perfection in any state, they necessarily decline, and seldom or never revive in that nation where they had formerly flourished.

To the general truth of these remarks history and experience oblige us to assent; but, insead of resting content with the fact, and acquiescing in its necessity, let us endeavour to trace it up to its cause, and to ascertain whether such fluctuations are really ordained by nature, or whether they arise from the untoward propensities of man.

In thus viewing the subject, it will presently be apparent, that there are direct and immediate causes for that obliteration and declension of science and art that we have just adverted to; that it has always

* See the Abbé Andres, as quoted in Mr. Roscoe's Discourse, delivered at the opening of the Liverpool Royal Institution.

been indicative of a degradation in the moral character of the people; characteristic of declining liberty, and of overwhelming oppression; of the rise of despotism, and the fall of freedom: That wherever these causes have co-operated, the best feelings and energies of the human mind have been blasted; effeminacy and indolence have slided into the place of manliness and activity; vice has gained the ascendancy over virtue; and all that is estimable in the human character, all social virtues and public spirit, have dwindled into selfishness and deceit. It is then to public morals and public liberty that we are to look up as the shield and helmet of the arts and sciences, and as constituting the anchor of their salvation. Under a jealous and suspicious government, be it republican or monarchical, the faculties and energies of the people are palsied and frozen up. Under a free constitution, the mind is neither agitated by apprehension, nor deadened by jealousy and suspicion; freedom of inquiry and of expression are interwoven with its very existence, and all the noblest

characters of man shoot forth with vigour and blossom in security.

In the Inaugural Oration which was spoken by the eloquent and learned Counsel to this Institution, at the ceremony of its foundation, these principles were well illustrated, by directing our attention to the spacious provinces which now compose the Ottoman Empire, but which once were the seat of science and of commerce. Then were they dignified by wisdom and valour, and were the fairest portion of the Christian world. But when the tyranny of their invaders deprived them of these inestimable blessings, no tongue can adequately describe the sad and melancholy reverse. Large territories dispeopled; goodly cities made desolate; sumptuous buildings become ruins; glorious temples subverted or prostituted; true religion discountenanced and oppressed; all nobility extinguished; violence and rapine exulting over all, and leaving no security except to abject minds and neglected poverty. Such is the state of a country without religion, and morals, and freedom: Would you behold a country in possession

of them, look to your own; contemplate the number and magnificence of her cities, the high state of her agriculture, the activity of her manufactures, the easy intercourse between all parts of the nation; her grand foundations both for learning and charity; the graceful dignity and conciliating ease of high life; the importance and respectability of the middle ranks; the industry and intelligence of the lower; the general veneration of the Constitution; the general obedience to the law; the general devotion to their Country.—Such is Britain. If it be inquired by what means she has attained this height of glory and prosperity, we must refer it, under the blessings of Providence, to our intellectual liberty; to the respect in which morality and religion are held by the public; and lastly, to that happy union of science and commerce, for which, in every part of her history, she has been eminently distinguished.

If from the earlier we descend to more recent times, to the period which has elapsed since the revival of letters, and which followed that melancholy chasm in the intel-

lectual and moral history of man, commonly called the middle ages, we shall find, that here also the same great truth is inculcated, the same relationship exhibited between ignorance and prejudice, and vice and slavery; between freedom and independence on the one hand, and every quality which adorns the intellectual capacity of man, on the other.

Towards the beginning of the 15th century, we discern the germs of those innovations which tended to the revival of letters in Europe; the landscape began to re-appear, after the inundation of barbarism with which it had been overwhelmed for the protracted period of nearly a thousand years, and various circumstances co-operated to give a new impulse and activity to causes which had long lain dormant; "for in no one age, from its commencement to its close, does the continuity of knowledge seem to have been entirely interrupted; there was always a faint twilight, like that auspicious gleam which in a summer night fills up the interval between the setting and rising sun." These causes have been so admirably sum-

med up by Dr. Robertson, in his View of the Progress of Society in Europe, from the subversion of the Roman Empire to the beginning of the 16th century, that I shall not attempt either to abridge or recapitulate them. The revival of letters was followed by the Protestant reformation, and by the invention of printing. The former encouraged a freedom of inquiry into religious matters, which diffused a congenial liberality of sentiment over other subjects of investigation; in philosophy it tended to dispel the trifling cavillings of Aristotle concerning matter, form, motion, and time; and it gradually led to the substitution of reason for habit, as a governing principle.

The invention of printing was also attended with most important effects upon the human mind. For us, says an elegant writer upon this subject*, who have been accustomed from our infancy to the use of books, it is not easy to form an adequate idea of the disadvantages which those laboured

* See Mr. Dugald Stewart's Dissertation, prefixed to the *Supplement to the Encyclopædia Britannica*.

under, who had to acquire the whole of their knowledge from universities and schools; blindly devoted, as the generality of students must then have been to the peculiar opinions of the teacher who first unfolded to their curiosity the treasures of literature and the wonders of science. Thus, error was perpetuated, and instead of yielding to time, acquired additional influence in each successive generation. In modern times, however, this influence of names is at an end. The object of a public teacher is no longer to inculcate a particular system of dogmas, but to prepare his pupils for exercising their own judgements. There is another circumstance which also especially merits attention, namely, the influence of the foregoing causes in encouraging among authors the practice of addressing the multitude in their own vernacular tongues. To the zeal of the reformers we owe this invaluable innovation; the sacred books were in almost all the kingdoms and states of Europe, translated into the language of each respective people, and from that moment the prejudice began to vanish which had so

long confounded knowledge with erudition, and a revolution commenced in the republic of letters analogous to what the invention of gunpowder produced in the art of war. "All the splendid distinctions of mankind," as the champion and flower of chivalry indignantly exclaimed, "were thereby thrown down, and the naked shepherd levelled with the knight clad in steel."

I have now, I trust, adduced sufficient evidence to prove the active causes that tend to the progress and welfare of literature, science, and art: to these we are to look, as the sources of those glorious conquests which were made in Europe within two centuries after the revival of letters; and it was under such auspicious influence, that in the reign of Elizabeth, the English mind put forth those unrivalled energies that conduce to the enthusiastic reverence with which we mention the names of Spenser, of Shakspeare, and of Milton,

> "Whither, as to their fountain, other stars
> Repair, and in their urns draw golden light:"

and which, concentred in Bacon, stamp him as the greatest, most universal, and

most eloquent of philosophers; whose doctrines, compared with the subtleties of the schools, are as the noon-day sun to the transitory meteors that float in the earth's atmosphere.

From these considerations, I am conducted to the second object of this Introductory Discourse, in which I am to endeavour to show the intimate union that subsists between the scientific and commercial interests of a country, and especially of Great Britain.

To show the necessary connexion that subsists between the progress of the sciences and that of the useful arts, and between commerce and intellectual improvement, will, I trust, become one of the leading objects of public instruction in this Amphitheatre; for it will not only stimulate to exertion by the flattering picture of human ability and resources which it displays, but will also show how much the happiness and perfection of our nature is concerned in the exercise of our relative and social feelings; how nearly our interests are connected where they often appear widest apart. The

philosopher, says Dr. Johnson, may very justly be delighted with the extent of his views, and the artificer with the readiness of his hands; but let the one remember, that without mechanical performances, refined speculation is an empty dream; and the other, that without theoretical reasoning, dexterity is little more than a brute instinct. It is, says he, pleasing to contemplate a manufacture, rising gradually from its first mean state, by the successive labours of innumerable minds; to consider the first hollow trunk of an oak, in which, perhaps, the shepherd could scarce venture to cross a brook swelled with a shower, enlarged at last into a ship of war, attacking fortresses, terrifying nations, setting storms and billows at defiance, and visiting the remotest parts of the globe. And it might dispose us to a kinder regard for the labours of one another, if we were to consider from what unpromising beginnings the most useful productions of art have probably arisen. Who, when he saw the first sand or ashes, by a casual intenseness of heat, melted into a metalline form, rugged with

excrescencies, and clouded with impurities, would have imagined that in this shapeless lump lay concealed so many conveniences of life as would in time constitute a great part of the happiness of the world? Yet, by some such fortuitous liquefaction was mankind taught to procure a body at once in a high degree solid and transparent, which might admit the light of the sun, and exclude the violence of the wind; which might extend the sight of the philosopher to new ranges of existence, and charm him at one time with the unbounded extent of the material creation, and at another with the endless subordination of animal life; and, what is yet of more importance, might supply the decays of nature, and succour old age with subsidiary sight. Thus was the first artificer in glass employed, though without his own knowledge or expectation. He was facilitating and prolonging the enjoyment of light, enlarging the avenues of science, and conferring the highest and most lasting pleasures; he was enabling the student to contemplate nature, and the beauty to behold herself.

It would be easy to trace other arts, and other manufactures, to their recondite and remote sources, and to display the most unexpected and important events springing from trifling causes, and of an apparently undignified origin. To show in the interwoven boughs of the grove, and the rude attempts of unlettered nations, the elements of Gothic and Grecian architecture. To discover the simple clothing of rude and barbarous countries, composed of the barks of trees and skins of animals, gradually merging into more and more complicated manufactures, in which usefulness and comfort are blended with beauty and elegance. To exhibit the simplest methods of reckoning time, the hour-glass, or the graduated candle, slowly leading to the pendulum-clock, and chronometer.

In all the arts, and in every branch of science, there has been the same slow, yet certain, progress; and in tracing their gradual progression, we shall ever find it most rapid and complete in those countries where Commerce and her attendants thrive and are cherished.

Under the influence of commerce, the barren islands of Venice gradually became the seats of wealth and magnificence, and the abode of literature, science, and the fine arts; and it will, perhaps, be remembered by many present, that, in his Inaugural Oration already quoted, your learned Counsel pointed the attention of his hearers to the splendour of the towns of Belgium, to their numerous public edifices of exquisite and costly architecture, and to the numberless paintings, and works in marble, gold, silver, iron, and bronze, with which they abound; and desiring us to recollect that, during a period of about two hundred years, all these cities have been in a declining state, reminded us of what they were in the sunshine of their prosperity. He told us, and truly too, that the fostering hand of commerce collected all these treasures. For, said he, till the imprudent conduct of the Dukes of Burgundy, and of the house of Austria, drove commerce to Amsterdam, the Netherlands were her favourite seat; and all these monuments of art and science owe their existence to the commercial acquisitions, and

well-directed munificence of the burghers of Bruges, Ghent, Antwerp, Brussels, and Louvaine.

With the commercial history of our own country, my audience cannot but be well acquainted. To point out the benefits flowing from its commercial aggrandizement would, indeed, be a pleasing labour, full of substantial and solid gratification; but we need only look around us, and every object that meets our eye proclaims the debt that is due to commerce; the very walls that surround us speak, and tell us that they were raised by her for the protection of Science. But the amount of this debt is rendered most obvious by considering our own country in its natural aspect, without any of the benefits and advantages of commerce, and we then presently discern, that without her, science would have been debarred of all her essential aids; she brings to our marts the produce of every climate; converts our tin into gold, and our wool into rubies. "I have often fancied," says Addison, in one of his essays on the benefits of commerce, "when I have been upon 'Change, one of

our old kings standing in person where he is represented in effigy, and looking down upon the wealthy concourse of people with which that place is every day filled. In this case, how would he be surprised to hear all the languages of Europe spoken in this little spot of his former dominions, and to see so many private men, who, in his time, would have been the vassals of some powerful baron, negotiating like Princes, for greater sums of money than were formerly to be met with in the royal treasury!"

While we are thus contemplating the means and power of commerce, and reflecting upon the liberal aid which science has received at her hands, let us not be unmindful of what remains to be done; let us hope that the acquaintance thus auspiciously begun, may advance to intimacy, friendship, and regard; and that the Mural Crown of our City, already the emblem of dominion and strength, may embrace within its protecting circle the interests of Science, and become adorned by the rays of intellectual light.

If commerce has, in many instances, mu-

nificently contributed to the promotion of science, science has, on the other hand, rendered liberal and essential service to our commercial interests; and of the various branches of science, Chemistry stands, in this respect, foremost in the first rank; so important, indeed, is it to the progress of society, that no people ever attained any considerable degree of civilization, independent of the chemical arts. The steam-engine is generally and universally allowed as the most noble and effective present ever made by philosophy to the arts: and, considered in the abstract, it is indeed singularly calculated to excite our admiration and surprise; but when we carry our eye from the simple instrument, to its applications; and when we view the numerous branches of manufacture that depend upon it as their prime mover, the understanding is scarcely capacious enough to grasp them, and wants power to do homage to those by whose skill and industry this machine was perfected, and tamed, as it were, into submission. Let me recommend those who complain of the introduction of machinery into our manu-

factures, and whose clamours are loud against this substitute for manual labour, to reflect upon the state we should have been in without it. One of two things must, in that case, have happened. Either our fields must have been overrun by invaders, and our importance in the scale of nations degraded into something worse than nonentity, while those who have so gloriously defended us abroad were busied at home at the loom and the distaff; or our traffic must have stagnated; and our trade, instead of having been shaken only, would have been wholly subverted and annihilated. Let us then be thankful that our liberties are preserved to us entire; that although we have indeed felt the shock which has palsied so great a portion of Europe, and reduced many of its states to trembling imbecility, we are still suffered to live, and breathe, and enjoy our being; and let us, above all things, seriously and steadfastly exert ourselves to avert the difficulties that surround us, with that manly and temperate zeal which becomes the British character.

Among the useful arts, it is difficult to

select one that is not very immediately dependent upon chemical principles: and in reverting to the history of those arts, we shall find ourselves obliged to confess, that their leading improvements have been derived from the same source. It would be trite and tedious to enumerate all that chemistry has done for the arts of bleaching, dyeing, calico-printing, and tanning; in the arts of pottery, of glass, and porcelain making, or in the apparently more remote operations of the brewer and the distiller; but it may not be useless to inform you, that the discovery of the present mode of making oil of vitriol, of preparing vinegar from wood, of extracting the pure acid from the lemon, that the abstruse and apparently abstract inquiries into the propagation and effects of heat, are so many sources whence these improvements have been derived; and whence individuals, often ignorant of their origin, have enriched themselves, and benefited the community. I the rather dwell upon these things, because it is a common, though a gross error, to depreciate the abstract inquiries of the philosopher and the

chemist, to consider all as empty and idle that does not contribute to immediate instruction or profit; forgetting how frequently it has happened, that even he who has excited the derision of his contemporaries, has merited and received the gratitude of posterity. "If what appears little be universally despised, nothing greater can be attained; for all that is great was at first little, and rose to its present bulk by gradual accessions and accumulated labours."

To enumerate all the advantages which science has conferred upon the arts, and thence to deduce its influence upon the welfare of our commercial interests, would lead me to inquiries of such extent and importance, as to exceed my adequacy to do justice to them; I can only recommend the investigation as well deserving attention, and more especially to those who sceptically deny the happy results of the intercourse between Science and Art.

Before I take my leave, I feel it my duty on this occasion, to advert to, and answer some objections that have been urged against literary and scientific establishments, con-

sidered in their relation to the mercantile world, and as affecting particular classes of society.

It has been said, that literary and scientific attainments are incompatible with that attention to business, with that activity of mind, which is essential to those who would flourish in mercantile and commercial occupations; and it has been supposed, that the young man who is just entering upon the career of life, is particularly open to such objectionable and unpropitious influence. But let us candidly and dispassionately look at the state of this question. There is no one whose mind can always and incessantly bear direction to one subject; whose thoughts will always run in the same channel; the bow must sometimes be unstrung; diversity of occupation must be resorted to for relief; and amusement must sometimes become our business. Whatever our occupation may be, some degree of variety and relaxation is required; and it is admitted upon all hands, that if these gaps and chasms in the life of a man of business are not employed in the acquisition of some kind of information, or

in the cultivation of some branch of literature, science, or art, they will seldom remain harmlessly employed. There are fortunately very few whose minds are so degenerate as to rest quiet in absolute idleness; and if these do not resolve to be industrious, they will seldom be employed without injury to themselves or others; unable to contain themselves in a neutral state, they invariably sink into vice, when no longer soaring towards virtue. It is indeed so absurd to suppose that the attention of a man of business is to be injured and distracted by occasional incursions into the regions of literature and science, that all objections to establishments like ours, founded upon such imputations, require only to be mentioned, in order to be rejected as the vapid miasmata of ignorance, or despised as the illicit offspring of prejudice and credulity. The mind of man was never intended for an "unweeded garden," but was formed for cultivation and embellishment. By the union of literature and science with the ordinary affairs of the world, we not only derive present enjoyment, but lay up a stock of future satisfac-

tion, which tends to recreate the languors of age, and to shed a lustre upon the evening of life. How different must be the view of past life in the man who is grown old in knowledge and wisdom, from that of him who is grown old in ignorance and folly! "The latter is like the owner of a barren country, that fills his eye with the prospect of naked hills and plains, producing nothing either profitable or ornamental; the other beholds a beautiful and spacious landscape, divided into delightful gardens, green meadows, fruitful fields; and can scarce cast his eye on a single spot of his possessions that is not covered with some beautiful plant or flower."

The last, and I trust to the present Audience, not the least interesting subject that it is my business at present to advert to, relates to the opportunities offered by establishments of the nature of this Institution, in improving female education. "It is not," said Sir H. Davy, in propounding the plan of the Royal Institution, "it is not our intention to invite them to assist in our laboratories, but to partake of that healthy

and refined amusement which results from a perception of the variety, order, and harmony, existing in all the kingdoms of nature; and to encourage the study of those more elegant departments of science, which at once tend to exalt the understanding and purify the heart."

It is somewhere said in the Rambler, that all appearance of science is particularly hateful to women; and that he who desires to be well received by them, must qualify himself by a total rejection of all that is rational and important; must consider learning as perpetually interdicted, and devote all his attention to trifles, and all his eloquence to compliment.

It is barely possible that such might have been the state of things at the middle of the last century; but the case is now widely different; and, in consequence of the diffusion of general knowledge and information that appears in all respectable classes of society, ignorance every where meets with contempt. In these observations it is very far from my intention to recommend the abstract sciences as part of female educa-

tion, but merely to advise the acquisition of general information. Pedantry is at all times nauseous, but never so disagreeable as in female attire, where it is always indicative of the absence of the more estimable and useful mental acquirements.

Let us then indulge the hope, and exert ourselves for its fulfilment, that within these walls Science and Literature may establish a permanent and friendly intercourse with Commerce and Trade; that they may enter into a league against ignorance, pedantry, and prejudice, in defence of the true ends of knowledge; that their merits may be duly appreciated, and set forth with dignity and with truth; and that these means may be so directed to the improvement of the moral as well as the intellectual character, that "our Merchants may become as Princes, and our Traffickers the truly honourable of the earth."

THE END.

Printed by R. and A. Taylor, Shoe Lane, London.

WELLCOME LIBRARY INSTITUTE